



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 09/777,603
Applicants : Robert G. ROODMAN et al.
Filed : February 6, 2001
Title : pH STABLE ACTIVATED CARBON
Group Art Unit : 1724 Confirmation No. : 3170
Examiner : Ivars C. Cintins Customer No. : 28289

DECLARATION UNDER 37 C.F.R. § 1.132

I, Robert G. Roodman, hereby declare as follows:

1. I am one of the named inventors of the invention described and claimed in the above-identified application.
2. I am President of Envirotrol, Inc., Sewickley, Pennsylvania, the assignee of the above-identified application.
3. I am familiar with the subject matter of the above-identified patent application, namely a process for controlling pH rise in a water purification process. I have read U.S. Patent No. 4,789,475 to Harte et al.
4. In order to demonstrate the superior results achieved by the process of the present invention compared to a process using a chelating agent (EDTA) described in the Harte patent for removing heavy metals from water, I performed experiments comparing the use of citric acid versus EDTA in controlling pH rise during start-up of water purification processes in beds of activated carbon.
5. In the experiments, 60 grams of 12x40 mesh granular, bituminous coal based, activated carbon (identified as "40F") was soaked in a solution of 100 g of water containing 1.0 g of citric acid. Similarly, 60 g of 8x30 mesh granular, coconut shell based, activated carbon (identified as "30S") was soaked in a solution of 100 g of water containing 1.0 g of citric acid.

Likewise, 60 grams of 12x40 mesh granular, bituminous coal based, activated carbon (40F) was soaked in a solution of 100 g of water containing 1.0 g of EDTA disodium salt powder, and 60 g of 8x30 mesh granular, coconut shell based, activated carbon (30S) was soaked in a solution of 100 g of water containing 1.0 g of EDTA disodium salt powder.

In all cases, the excess solution was drained off the carbon. Each carbon sample was placed into a 136 ml bed and exposed to a flow of Beaver Falls, PA city water having a pH of 6.78. The flow rate was 170 ml/min, such that 75 bed volumes passed through the bed every hour. The effluent pH was monitored over time and is summarized in the table below.

Time (min)	Bed Volume	pH READING							
		CITRIC ACID				EDTA			
		40 F	pH Change	30 S	pH Change	40 F	pH Change	30 S	pH Change
1	1.25	6.23	-0.55	6.72	-0.06	7.61	0.83	6.60	-0.18
2	2.5	6.37	-0.41	6.84	0.06	7.87	1.09	7.28	0.50
3	3.75	6.44	-0.34	6.89	0.11	8.05	1.27	7.60	0.82
4	5	6.50	-0.28	6.94	0.16	8.13	1.35	7.83	1.05
5	6.25	6.55	-0.23	6.98	0.20	8.17	1.39	7.93	1.15
6	7.5	6.59	-0.19	7.01	0.23	8.21	1.43	8.01	1.23
7	8.75	6.62	-0.16	7.03	0.25	8.23	1.45	8.10	1.32
8	10	6.65	-0.13	7.05	0.27	8.25	1.47	8.14	1.36
9	11.25	6.67	-0.11	7.07	0.29	8.27	1.49	8.21	1.43
10	12.5	6.70	-0.08	7.09	0.31	8.28	1.50	8.25	1.47
11	13.75	6.72	-0.06	7.11	0.33	8.29	1.51	8.29	1.51
12	15	6.74	-0.04	7.12	0.34	8.29	1.51	8.32	1.54
13	16.25	6.75	-0.03	7.14	0.36	8.30	1.52	8.34	1.56
14	17.5	6.77	-0.01	7.15	0.37	8.30	1.52	8.35	1.57
15	18.75	6.78	0.00	7.17	0.39	8.30	1.52	8.37	1.59
16	20	6.80	0.02	7.18	0.40	8.30	1.52	8.38	1.60
17	21.25	6.81	0.03	7.19	0.41	8.31	1.53	8.40	1.62
18	22.5	6.82	0.04	7.20	0.42	8.30	1.52	8.41	1.63
19	23.75	6.83	0.05	7.21	0.43	8.30	1.52	8.42	1.64
20	25	6.84	0.06	7.22	0.44	8.30	1.52	8.43	1.65
21	26.25	6.86	0.08	7.23	0.45	8.30	1.52	8.43	1.65
22	27.5	6.87	0.09	7.25	0.47	8.30	1.52	8.44	1.66
23	28.75	6.87	0.09	7.25	0.47	8.30	1.52	8.44	1.66
24	30	6.88	0.10	7.26	0.48	8.30	1.52	8.45	1.67
25	31.25	6.89	0.11	7.27	0.49	8.29	1.51	8.46	1.68
26	32.5	6.90	0.12	7.28	0.50	8.29	1.51	8.46	1.68
27	33.75	6.91	0.13	7.28	0.50	8.28	1.50	8.46	1.68
28	35	6.92	0.14	7.29	0.51	8.28	1.50	8.46	1.68
29	36.25	6.92	0.14	7.30	0.52	8.28	1.50	8.46	1.68
30	37.5	6.93	0.15	7.31	0.53	8.27	1.49	8.46	1.68

Time (min)	Bed Volume	pH READING							
		CITRIC ACID				EDTA			
		40 F	pH Change	30 S	pH Change	40 F	pH Change	30 S	pH Change
31	38.75	6.94	0.16	7.31	0.53	8.27	1.49	8.46	1.68
32	40	6.94	0.16	7.32	0.54	8.27	1.49	8.46	1.68
33	41.25	6.95	0.17	7.33	0.55	8.26	1.48	8.46	1.68
34	42.5	6.95	0.17	7.33	0.55	8.26	1.48	8.46	1.68
35	43.75	6.95	0.17	7.34	0.56	8.26	1.48	8.46	1.68
36	45	6.96	0.18	7.35	0.57	8.26	1.48	8.45	1.67
37	46.25	6.96	0.18	7.35	0.57	8.25	1.47	8.45	1.67
38	47.5	6.96	0.18	7.36	0.58	8.25	1.47	8.45	1.67
39	48.75	6.97	0.19	7.37	0.59	8.25	1.47	8.45	1.67
40	50	6.97	0.19	7.37	0.59	8.25	1.47	8.45	1.67
41	51.25	6.98	0.20	7.38	0.60	8.24	1.46	8.45	1.67
42	52.5	6.98	0.20	7.38	0.60	8.24	1.46	8.45	1.67
43	53.75	6.98	0.20	7.39	0.61	8.24	1.46	8.45	1.67
44	55	6.99	0.21	7.39	0.61	8.24	1.46	8.45	1.67
45	56.25	6.99	0.21	7.39	0.61	8.23	1.45	8.44	1.66
46	57.5	7.00	0.22	7.40	0.62	8.23	1.45	8.44	1.66
47	58.75	7.00	0.22	7.40	0.62	8.23	1.45	8.44	1.66
48	60	7.01	0.23	7.41	0.63	8.22	1.44	8.45	1.67
49	61.25	7.01	0.23	7.41	0.63	8.22	1.44	8.44	1.66
50	62.5	7.02	0.24	7.42	0.64	8.22	1.44	8.44	1.66
51	63.75	7.02	0.24	7.42	0.64	8.21	1.43	8.44	1.66
52	65	7.03	0.25	7.42	0.64	8.21	1.43	8.44	1.66
53	66.25	7.03	0.25	7.43	0.65	8.21	1.43	8.44	1.66
54	67.5	7.03	0.25	7.43	0.65	8.21	1.43	8.44	1.66
55	68.75	7.04	0.26	7.44	0.66	8.20	1.42	8.44	1.66
56	70	7.04	0.26	7.44	0.66	8.20	1.42	8.44	1.66
57	71.25	7.04	0.26	7.44	0.66	8.20	1.42	8.44	1.66
58	72.5	7.05	0.27	7.45	0.67	8.20	1.42	8.44	1.66
59	73.75	7.05	0.27	7.45	0.67	8.20	1.42	8.44	1.66
60	75	7.06	0.28	7.45	0.67	8.18	1.40	8.44	1.66
pH measured hereafter at 15 minute intervals									
75	93.75	7.11	0.33	7.49	0.71	8.16	1.38	8.42	1.64
90	112.5	7.13	0.35	7.53	0.75	8.14	1.36	8.41	1.63
105	131.25	7.16	0.38	7.55	0.77	8.13	1.35	8.39	1.61
120	150	7.23	0.45	7.56	0.78	8.10	1.32	8.37	1.59
135	168.75	7.26	0.48	7.58	0.80	8.08	1.30	8.36	1.58
150	187.5	7.30	0.52	7.59	0.81	8.10	1.32	8.34	1.56
165	206.25	7.32	0.54	7.60	0.82	8.09	1.31	8.33	1.55
180	225	7.33	0.55	7.60	0.82	8.06	1.28	8.32	1.54

6. The data demonstrate the ability of the citric acid solution to maintain an outflow pH of plus or minus 1 pH unit during and after the start-up phase of treating an aqueous system with an activated carbon bed according to the process of the present invention. The data for the EDTA treated carbon show that the pH

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rise is unacceptable using that composition during the start-up phase of a water treatment process.

6. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.


Robert G. Roodman

11/3/04
Date